**AMENDMENTS TO THE CLAIMS:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Previously Presented) A method for controlling blood flow through an extracorporeal circuit coupled to a blood pump comprising:

a. continuously withdrawing the blood from a withdrawal blood vessel in a patient into the extracorporeal circuit, processing the blood in the circuit, and infusing the processed blood into the patient in a continuous manner;

b. detecting an occlusion which at least partially blocks the withdrawal of blood from the patient;

c. interrupting the continuous step (a), and automatically and temporarily ceasing the withdrawal of the blood to after step (b), and

d. resuming step (a) automatically after step (c) to resume withdrawal of the blood .

2. (Original) A method for controlling blood flow as in claim 1 wherein the occlusion is detected based on a pressure measurement of the blood in the circuit.

3. (Cancelled)

4. (Previously Presented) A method for controlling blood flow as in claim 1 wherein blood flow is ceased after the blood flow is gradually reduced during step (a).

5. (Previously Presented) A method for controlling blood flow as in claim 1 wherein blood flow is ceased after the blood flow is gradually reduced during step (a).

6. (Previously Presented) A method for controlling blood flow as in claim 1 wherein blood flow is ceased after the withdrawal blood vessel collapses.

7. (Previously Presented) A method for controlling blood flow as in claim 1 wherein the flow is temporarily ceased after an occlusion has been detected in the withdrawal blood vessel and later automatically reversed before resuming step (a).

8. (Previously Presented) A method for controlling blood flow as in claim 1 wherein the blood flow is automatically ceased for a predetermined duration and later automatically restarted by performing step (a).

9. (Previously Presented) A method for controlling blood flow as in claim 1 wherein the blood flow is automatically ceased for a predetermined duration and later automatically restarted by performing step (a) based upon blood flow being measured less than a specified predetermined limit..

10. (Previously Presented) A method for controlling blood flow as in claim 1 wherein the flow rate is substantially reduced during step (a) and prior to the detection of the occlusion in step (b).

11. (Original) A method for controlling blood flow as in claim 1 wherein the step (a) is repeated after step (c) when a flow capacity of the withdrawal blood vessel substantially increases.

12. (Previously Presented) A method for controlling blood flow as in claim 1 further comprising gradually reducing blood flow prior to step (b).

13. (Previously Presented) A method of controlling an extracorporeal circuit having a blood pump, said method comprising:

a. withdrawing blood from a withdrawal blood vessel in a patient into the extracorporeal circuit, filtering the blood in a blood filter and continually infusing the filtered blood into the patient;

b. determining a withdrawal blood pressure in the extracorporeal circuit;

c. withdrawing blood at a flow rate based on an algorithm executed by the blood pump that correlates the flow rate to the withdrawal blood pressure;

d. interrupting step (a) to temporarily stop the blood pump and cease blood flow to infuse blood from the circuit into the withdrawal blood vessel if the flow rate determined in step (c) is reduced to below a predetermined limit, and

e. automatically resuming step (a) after step (d).

14. (Original) A method of controlling an extracorporeal blood circuit as in claim 13 wherein the predetermined limit is a blood flow rate of substantially zero.

15. (Currently Amended) A method of controlling an extracorporeal blood circuit as in claim 13 further comprising:

fe. detecting an occlusion which at least partially blocks the withdrawal of blood from the patient, and

gf. temporarily ceasing a flow of the blood to infuse blood from the circuit into an infusion blood vessel and temporarily ceasing the withdraw blood from the withdrawal vessel if a pump controller executing the algorithm is unsuccessful in maintaining significant blood flow.

16. (Previously Presented) A method for controlling withdrawal of blood from a patient into an extracorporeal circuit which continuously withdraws blood from a patient, processes the blood and infuses the processed blood into the patient, and allowing for detection of and recovery from a reduced flow capacity or total occlusion of a withdrawal blood vessel, comprising:

a. reducing blood flow being withdrawn from the patient when a withdrawal pressure of the blood in the circuit becomes more negative than an occlusion limit that is a function of blood flow through the circuit, and

b. if the reduced blood flow is reduced below a predetermined minimal flow during step (a), then interrupting the continuous withdrawal, processing and infusion of blood, and automatically and temporarily ceasing the flow of blood in the circuit.

17. (Previously Presented) A method as in claim 16 further comprising:

c. prior to step (a), increasing a rate of blood being withdrawn until the withdrawal blood vessel begins to collapse and occlude blood withdrawal;

d. prior to step (a), determining an occlusion withdrawal pressure corresponding to collapse of the vessel,

e. initiating step (b) when the collapse withdrawal pressure is detected.

18. (Original) A method as in the claim 17 wherein the collapse withdrawal pressure is a variable and a function of withdrawal blood flow.

19. (Original) A method as in claim 17 wherein the collapse withdrawal pressure is periodically reestablished by stopping the blood flow through the circuit pump and then performing steps (c), (d) and (e).

20. (Previously Presented) A system for controlling blood flow withdrawn from a patient comprising:

an extracorporeal circuit having a blood passage including a blood withdrawal tube, a treatment device and an infusion tube,

a pressure sensor coupled to said withdrawal tube and sensing a blood pressure in the withdrawal tube;

a pump coupled to the circuit and adapted to move blood through the blood passage at a controlled flow rate, and

a pump controller receiving a blood pressure signal from the pressure sensor and controlling the pump to regulate the controlled flow rate, wherein the pump controller includes a processor and a memory storing a control algorithm of a variable withdrawal pressure target as a function of flow rate, said controller

reduces the controlled flow rate based on a difference between a withdrawal pressure sensed by the pressure sensor and the withdrawal pressure target, wherein said controller temporarily ceases blood flow through the withdrawal tube if the controlled flow rate is reduced below a predetermined limit and said controller later automatically restarts blood flow through the withdrawal.

21. (Original) A system as in claim 20 wherein the pump controller includes a proportional integral feed forward pressure controller.

22. (Original) A system as in claim 20 wherein the treatment device is a hemofilter.

23. (Original) A system as in claim 20 wherein the treatment device is a dialysis device.

24. (Original) A system as in claim 20 wherein the pressure sensor is a real time sensor providing real time pressure signals to the pump controller.

25. (Original) A system as in claim 20 wherein the pump includes a direct DC drive motor.

26. (Original) A system as in claim 25 wherein the drive motor is a brushless motor.

27. (Original) A system as in claim 20 wherein the treatment device is a blood filter.

28. (Original) A system as in claim 20 wherein the pressure controller alternatively controls a withdrawal pressure and an infusion pressure by synchronized switching.

29. through 36 (Cancelled).

37. (New) A leak detector comprising:

at least one actuator controlled by a controller, said at least one actuator being configured to control pressure in a blood circuit, said controller configured to control flow in said blood circuit and detect a loss of integrity in said blood circuit by:

delivering blood to a patient through the blood circuit during first time including applying a positive gauge pressure to said circuit;

applying a negative pressure to said blood circuit during second time;

detecting a presence of air in said blood circuit during at least a portion of said second time or after said second times, such that air infiltrating said blood circuit during said second time as a result of said negative pressure and a presence of a leak is detected.

38. (New) A detector as in claim 37, wherein said controller is further configured to wait passage of a predetermined volume of blood into said patient prior to applying said negative pressure.

39. (New) A detector as in claim 37, wherein said controller is further configured such that said applying a negative pressure includes reversing a direction of flow of blood in said blood circuit.

40. (New) A detector as in claim 37, wherein said controller is further configured such that said applying a negative pressure includes changing a volume of a portion of said blood circuit.

41. (New) A detector as in claim 37, wherein said controller is further configured such that said detecting includes detecting air bubbles in blood.

42. (New) A detector as in claim 37, wherein said controller is further configured such that:

said applying includes reversing a direction of flow of blood in said blood circuit;

said detecting includes detecting air with an air sensor located to detect air at a specified position in said blood circuit; and

a duration of said second time is at least long enough to insure that blood will ultimately flow from a terminus of said blood circuit to said specified position, whereby leakage of blood in said blood circuit at least between said specified position and said terminus is assured.

43. (New) A leak detector connectable to a blood processing machine that has an access blood circuit connectable to a patient to remove blood from, and deliver blood to, said patient; a process blood circuit including a treatment component for treating blood circulated through said process blood circuit, said leak detector comprising:

a reversible conveyance connected to move blood through said process and access blood circuits;

an air detector in said access circuit;

a controller configured to reverse said conveyance periodically to draw air into any leaks in said blood circuit and to control said conveyance such that said air is moved to said air detector, whereby a leak in said access blood circuit may be detected.

44. (New) A detector as in claim 43, wherein said controller is configured to reverse said conveyance such that a volume of blood at least as great as a volume of said

access blood circuit between said air detector and a remote terminus of said access blood circuit.

45. (New) A detector as in claim 43, wherein said air detector detects air bubbles in fluid.

46. (New) A leak detector connectable to a device operative to control a flow of blood through a blood circuit, said leak detector including a controller programmed to implement a method of detecting a leak in a fluid circuit supplying fluid to a patient, comprising:

delivering fluid to a patient through a circuit during a first time;

applying a negative pressure to said blood circuit during a second time;

detecting a presence of air in said fluid circuit during at least a portion of said second time or after said second time such that air infiltrating said fluid circuit during said second time as a result of said negative pressure is detected.

47. (New) A detector as in claim 46, wherein said step of applying a negative pressure includes reversing a direction of flow of fluid in said fluid circuit.

48. (New) A detector as in claim 46, wherein said step of detecting includes detecting air bubbles in fluid.

49. (New) A detector as in claim 46, wherein:

said step of applying includes reversing a direction of flow of fluid in said fluid circuit;

said step of detecting includes detecting air with an air sensor located to detect air at a specified position in said fluid circuit; and

a duration of said second time is at least long as required to cause said fluid to flow from a terminus of said fluid circuit to said specified position.

50. (New) A leak detector comprising:

a controller configured to detect a leak in a fluid infusion or treatment system that includes a source of fluid to be pumped into a patient;

the controller drawing from said source and conveying said fluid from said source to said patient during a first time and automatically regularly generating a negative pressure such that said fluid is drawn in a reverse direction away from said patient creating a reverse flow of said fluid and one detecting a presence and a flow of air into said fluid infusion system.

51. (New) A detector as in claim 50, further comprising a sensor connected to said controller to detect a presence of air in said reverse flow.

52. (New) A detector as in claim 50, wherein said fluid includes blood.

53. (New) A detector as in claim 50 wherein said controller is configured to one of generate an alarm signal and halt a flow of fluid responsively to detecting said one of a presence and a flow.

54. (New) A detector as in claim 50, wherein said fluid is blood.

55. (New) A detector as in claim 50, wherein said controller generates said negative pressure by controlling a flow reversing actuator.

56. (New) A detector as in claim 55, wherein said fluid is blood.

57. (New) A detector as in claim 50, wherein said source of fluid is said patient's blood supply and said reverse flow is such that blood is drawn from said patient.

58. (New) A detector as in claim 57, wherein said fluid is blood.

59. (New) A leak detector for a sterile contiguous fluid line for infusing a patient, the fluid line including a draw line connectable to at least one patient access and a return line connectable to said at least one patient access, said detector comprising:

a portion adapted to be interoperable with a pump actuator such that fluid may be conveyed therethrough;

a filter, or filter connectors to permit connection to a filter, to complete a closed fluid circuit joining said draw and return lines;

at least a wetted portion of a device configured to generate a negative pressure in said return line, whereby a flow through said return line may be reversed.

60. (New) A detector line as in claim 59, wherein said device configured to generate a negative pressure is further configured to reverse a flow in both said return line and said draw line.

61. (New) A leak detector for an infusion device for delivering a fluid to a patient, the device including a circuit including a pump, a source end and a delivery end joined by said pump, comprising:

a mechanism to reverse flow at least at said delivery end;

an air detector in said circuit;

said mechanism being controlled such that said mechanism is actuated to reverse said flow automatically and regularly and, at each instance of reversing said flow, to displace enough fluid to transport air infiltrating said circuit at said delivery end to said air detector.

62. (New) A detector as in claim 61, wherein said mechanism is a drive configured to reverse said pump.

63. (New) A leak detector with at least one actuator and a controller programmed to implement a method of detecting a loss of integrity in a liquid circuit, comprising:

conveying liquid through a circuit during first time;

said step of conveying including applying a positive gauge pressure to said circuit; regularly applying a negative pressure to said circuit during second time;

detecting a presence of air in said liquid circuit during at least a portion of said second time or after said second time, such that air infiltrating said circuit during said second time, as a result of said negative pressure and a presence of a leak, is detected.

64. (New) A detector as in claim 63, wherein the step of applying a negative pressure includes reversing a direction of flow of liquid in said circuit.

65. (New) A detector as in claim 63, wherein said step of detecting includes detecting air bubbles.

66. (New) A leak detector for an infusion device that includes a circuit connectable to a patient to deliver fluid to a patient, comprising:

a reversible conveyance connected to move fluid through said circuit;

an air detector in said circuit;

a controller configured to reverse said conveyance regularly and periodically to draw air into any leaks in said circuit and move said air to said air detector, whereby a leak in said circuit may be detected.

67. (New) A detector as in claim 66, wherein said air detector detects air bubbles in said fluid.

68. (New) A leak detector for a blood processing machine that includes a draw circuit and a return circuit connected, respectively, to supply blood from a patient to, and return blood to said patient from, a blood processing device, comprising:

a reversible conveyance connected in said draw and return circuits to drive blood therethrough;

a controller connected to control said reversible conveyance such that said reversible conveyance is regularly reversed;

at least one air sensor in said circuit;

said controller being configured such that a volume of blood displaced in reverse each time said reversible conveyance is reversed is sufficient to insure blood from a terminal end of said return circuit is drawn at least to said at least one air sensor.

69. (New) A leak detector as in claim 68, wherein said air sensor detects bubbles in blood.

70. (New) A leak detector as in claim 68, wherein said reversible conveyance includes a reversible pump.

71. (New) A device for detecting leaks and connectable to a blood processing system having an air sensor adapted to detect blood in a blood circuit, said blood circuit having draw and return lines:

a conduit connectable to said return line;

a fluid conveyance connectable to said return line and said conduit and configured to connect said return line to a patient return access;

said conveyance being adapted to selectively and generate a reverse flow in said conduit and convey said reverse flow to said draw line;

a final control configured to control said conveyance to generate said reverse flow repeatedly during a treatment cycle of said blood processing leak detector.

72. A leak detector for a blood processing machine that includes an access blood circuit connectable to a patient to remove blood from, and deliver blood to, said patient and a process blood circuit including a treatment component adapted to treat blood circulated through said process blood circuit, comprising:

a conveyance connected to move blood through said process and access blood circuits configured to generate a negative pressure in a return portion of said access blood circuit;

an detector configured to detect infiltration of air in said return portion;

a controller configured to generate said negative pressure in said conveyance repeatedly during a treatment cycle to draw air into said access circuit.

73. (New) A detector as in claim 46, wherein said step of applying a negative pressure includes changing a volume of a portion of said fluid circuit.